COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

June 24, 2022

Bradford Janes
Raptor Materials LLC
8120 Gage Street
Frederick, CO 80516

Re: Two Rivers Sand, Gravel and Reservoir Project, File No. M-2022-013, 112c Permit Application Adequacy Review

Mr. Janes -

The Division of Reclamation, Mining and Safety (Division/DRMS) reviewed the contents of the 112c permit application for the Two Rivers Sand, Gravel and Reservoir Project (TRP), File No. M-2022-013 and submits the following comments. The Division is required to issue an approval or denial decision no later than July 17, 2022, therefore a response to the following adequacy review concerns should be submitted to the Division as soon as possible.

The review consisted of comparing the application contents with the specific requirements of Rules 1, 3, 6.1, 6.2, 6.4 and 6.5 of the Minerals Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials (effective date July 15, 2019). Any inadequacies are identified under the respective exhibit heading along with suggested actions to correct them.

General Comments

1) On May 18, 2022, the Division approved a transfer of the Two Rivers Sand, Gravel and Reservoir Project 112 Application from Varra Companies, Inc. to Raptor Materials, LLC. Please provide a letter from Kevin Jeakins (as part of your response to this adequacy review) stating that Bradford Janes is authorized to act as a permitting representative of Raptor Materials LLC.
2) Please commit to submitting Financial and Performance Warranties with the name Raptor Materials LLC.
3) The Division received timely state agency comments from History Colorado and the Division of Water Resources, as well as a late comment letter from Colorado Parks and Wildlife. The letters from these agencies are included as an enclosure with this adequacy review letter. Please review the letters and provide comments accordingly.

Application Form

4) The application form must be updated to indicate that the new permittee is Raptor Materials LLC.

5) On Page 1, Item #1.1 of the application form, the Applicant indicated the type of organization as a corporation. Please provide the corporation seal on Page 8 of the application form, if the corporation does not have a seal please indicate "no seal".

6.2 General Requirements of Exhibits

6) Rule 6.2.1(2)(b) requires maps be signed by a registered land surveyor, professional engineer, or other qualified person. Please submit signed copies of the Exhibit C and Exhibit F maps

6.4 Specific Exhibit Requirements - Regular 112 Operations

The following items must be addressed by the Applicant in order to satisfy the Mineral Rules and Regulations of the Mined Land Reclamation Board:

6.4.1 Exhibit A - Legal Description

7) The Applicant indicated that a portion of the permit area is in Sections 3 and 4 of Township 4 North, Range 65 West. However, it appears (based on the Exhibit Map in Exhibit B) that the text should indicate Range 66 West instead of 65 West. Please address this apparent error, and revise the Exhibit A text as necessary.
8) It appears that the coordinates for the Central Field SW Entrance are incorrect. Please check them and revise the Exhibit A text as necessary. (The coordinates listed for this entrance appear to be near the Varra Coulson Project.)

6.4.3 Exhibit C - Pre-Mining and Mining Plan Maps of Affected Land

9) The irrigation ditches need to be clearly shown and labeled on the Existing Conditions Map (Exhibit C-1).
10) Also, per Rule 6.4.3(e), the existing vegetation at the site should be shown.
11) The scale on Exhibit C-1 appears to be incorrect. Please check and revise as necessary.
12) The legend on Exhibit C-1 includes the 100-year floodplain, but the floodplain lines are not on the map. These lines should be added to this map as well as the Extraction Plan Map, Exhibit C-2.
13) For the sake of clarity, the Division recommends that the entire permit area be permitted to be affected, and this should be stated in Exhibit C and Exhibit D. (The Division recognizes that this statement is made in Exhibit L.)
14) During the pre-operations inspection on June 14, 2022, the idea of relocating the access point at the northwest corner of the site (to the east) was discussed. Please update Exhibit C-2 to reflect any change in that location.
15) Please add the following to the Extraction Plan Map, Exhibit C-2: roads, parking and equipment storage areas, levees, soil piles, keyways, settling basins, and other structures pertinent to the mining operation that are not currently shown on the map. Comments on the map can indicate where these features are subject to change.

6.4.4 Exhibit D - Mining Plan

16) In this and other exhibits, an effort should be made to update agency names. For example, the Colorado Division of Wildlife is now Colorado Parks and Wildlife. The abbreviation CDH should be CDPHE.
17) The mining plan (aka extraction plan) requires more detail. In particular, the plan should include a schedule that specifies the areas to be worked for given phases, with ranges of time periods. The phases described in Exhibit D should be coordinated with the Extraction Plan Map, Exhibit C-2. The operator can change the plan later, as needed, with technical revisions and/or amendments. Additional clarification on the sequence of the mining plan is necessary to calculate the required financial warranty.
18) The discussion on pages 6 and 7 regarding structures and easements should discuss which structures and easements will be relocated or removed from the site (if any).
19) On page 7, more detail is needed for the roads onsite. Please explain which roads will be built and which will be modified. Explain construction method and dimensions.
20) On pages 12 – 13, the discussion on stockpiles should include text indicating that soil management practices will protect the soil piles from erosion, prevent contamination of the soil from toxic or acid-forming material, and insure that the soil will remain usable for reclamation.
21) On page 14 in the second to last paragraph, the sentence that begins “Specific variations in the location of …” should be rewritten. The structure of this sentence does not follow standard rules of grammar, and (more importantly) the meaning is not clear. Please revise this statement accordingly.
22) On page 14 in the last paragraph, the units are not specified (appears to be 125 feet), and this should be revised. Also, add a discussion on pipelines to this paragraph as appropriate.
23) On page 16, regarding the discussion on topsoil and overburden stockpiles, more detail is needed regarding the storage volumes and locations of the piles, including distances from the piles to the areas to be reclaimed. It is recommended that they be shown on Map C-5. It should also be stated that the piles will be configured to prevent obstruction of flood waters, namely elongate the piles to make them parallel to the flow direction.
24) In the section Plant Site Development & Operations, text should be added regarding the details of structures that will be built, including the conveyor. Dimensions and other details should be provided to aid in the estimate of demolition costs for these structures.
25) In the section Plant Site Development & Operations, text should be added regarding the control of prairie dogs. Will they be relocated?
26) The applicant should discuss the following (related to Rule 3.1.8): How will the operation minimize impacts on mule deer habitat during the winter season (December 1 through April 30). This should include (but not be limited to) a discussion on fencing. Fencing should be limited as practical, and wildlife-friendly fencing should be used.
27) Include a discussion on how the operation will allow for deer and other animals to “escape” the mining operations.

6.4.5 Exhibit E - Reclamation Plan

28) The Application form specifies that the post-mining land use of the site will be developed water resource. Additionally, the Applicant has provided a shadowing/mounding analysis for the installation of clay liners. However, the Reclamation Plan notes (page 5) that lining of the reservoirs is an option only. If the Applicant wishes to maintain lining of the reservoirs as an option only, then the Application must be revised to reflect that the reservoirs will be reclaimed to open groundwater ponds. If the Applicant chooses to reclaim the reservoirs to open groundwater ponds, then the following options are available to address the liability associated with exposed groundwater:
    a) Provide adequate bond to backfill the pit to two feet above the historic highest groundwater level.
    b) Obtain a court approved augmentation plan prior to exposing groundwater at the site.

    Alternatively, the Applicant may clarify that the post-mining land use of developed water resource will be achieved through clay lining the reservoirs. If the Applicant chooses to clay line the reservoirs, then the Applicant shall provide enough detail for the Division to calculate the cost to line the reservoirs.

29) The reclamation plan requires more detail. In particular, the plan should include a schedule that specifies the areas to be reclaimed for given phases, with ranges of time periods. The phases described in Exhibit E should be coordinated with the Reclamation Plan Map, Exhibit F.
30) The discussion on pit slopes (pages 4 – 5) should include a discussion on the method for grading these slopes, including push distances. Also, the discussion should include the method for verifying the final slopes and documenting this information.
31) The reclamation plan needs to state that all compacted areas will be ripped prior to addition of topsoil and seed.
32) The reclamation plan needs to include a clear plan for the storage and application of topsoil prior to seeding. The plan should include push distances to the areas and minimum depth.
33) On page 6, the discussion on seeding should include timing of seeding (and planting if applicable). At what time of year will seeding operations be conducted?
34) The weed control paragraph (page 9) should reference the more detailed plan in Exhibit I/J.
35) The Backfill Notice must state the maximum quantity of inert fill that will be stockpiled on the site at any given time. This information is necessary to calculate the required financial warranty amount. Will buildings or other structures be constructed on backfill areas? If so, how will the material be placed and stabilized to prevent settling and voids?
36) The applicant should discuss the following related to the ponds:
    - The use of very flat slopes (8H:1V) and irregular shorelines in some locations, to allow for diverse habitat.
    - The use of constructed islands in the ponds for wildlife habitat.

6.4.5 Exhibit F - Reclamation Plan Map

37) The permit boundary is not shown on this map and needs to be added (or the line weight needs to be larger to improve clarity).
38) A legend should be added to the map clearly showing what the hatching and other features represent. A yellow box is shown at the southeast corner of the site; please indicate if this symbol represents a real feature or if it is an error.
39) It appears that the map requires more detail regarding the processing area. Do the topographical lines on Exhibit F accurately show the post-mining topography? If not, the map needs to be updated.
40) Per Rule 6.4.6, post-mining land uses should be shown on the map. This is especially important for the material processing and wash pond areas.
41) Several structures and easements are shown on Exhibit C-1, and none are shown on Exhibit F. Please explain if all of these structures will be removed during the mining and reclamation operations.
42) The Division recommends adjusting the scale on this map. The current version includes considerable area that is beyond the permit boundary.

6.4.7 Exhibit G - Water Information

43) On Page 1 of Exhibit G, the text states that the site will drain internally. Please add a statement that the site will be operated to prevent any significant runoff from disturbed areas from flowing offsite. Also state that the site will be operated to prevent any negative impacts to the hydrologic balance of the two rivers.
44) Describe the physical dewatering system and provide a description of the operation of this system.
45) The Water Information exhibit should provide a detailed discussion of floodplain management at the site. This must include a discussion of the conveyor crossing of the Big Thompson River. It should also reference the Floodplain Permit report by Headwaters Corporation, as appropriate.
46) To ensure that the Two Rivers project does not impact the hydrologic balance of the rivers, the application needs to include a water quality monitoring plan, specifically for the alluvium. ~~[see Section 20 - Exhibit G in Adequacy Response]~~ The groundwater monitoring plan should be developed in accordance with Rule 3.1.7(7)(b) and should include a Quality Assurance Project Plan (QAPP) for the collection of groundwater samples. The plan should provide mitigation steps if there is an exceedance at a groundwater or surface water monitoring location. Potential impacts to quality and/or quantity the nearby domestic wells should also be addressed. A copy of the Division's Groundwater Monitoring and Protection Technical Bulletin has been included as an enclosure to this letter for your reference.
47) Change "NPDES" to "CDPS" to reflect the requirements of the Water Quality Control Commission.

Exh H - Wildlife

48) Indicate which recommendations on wildlife protection in "Threatened and Endangered Species Habitat Assessment, Two Rivers Parcels" (ERO, 2022) will be implemented at the site. This report was submitted with Exhibit H of your application.

Exhibits I/J

49) This exhibit should include a discussion on wetlands in the project area, including the wash pond and material processing areas. Please state that operations will be conducted to minimize impacts on wetlands or state that no operations will be conducted in wetland areas.
50) In the Weed Management Plan, the paragraph that mentions the State of Colorado noxious weeds list should state that List A species will be eradicated and List B Species will be controlled. The plan should also describe the efforts that will be made to control List C species, including field bindweed, a focus in Weld County. The Division recognizes that mapping and vector identification can be useful tools for weed control, but these practices should not delay treatment of weeds.

6.4.12 Exhibit L - Reclamation Costs

51) This exhibit should be updated, as necessary, to match any revisions to Exhibits D and E, per the adequacy items for those sections. This includes details on structures.
52) The cost estimate should include a task for ripping areas that will be topsoiled and vegetated.
53) The Applicant has noted under the Reclamation Plan (page 5) that water shares will be dedicated to the Division of Water Resources (DWR) to cover the liability associated with exposing groundwater. Please be aware that the Division no longer accepts the dedication of water shares to DWR as a bonding mechanism. The Applicant will need to post a financial warranty to allow for backfilling the areas of exposed groundwater or a financial warranty to cover the cost of installing clay liners in the reservoir. Please see additional comments under Item No. 29.

6.4.13 Exhibit M - Other Permit and Licenses

54) Please commit to providing copies of all required and approved permits and licenses to the Division when available. This should include well permits and documents related to water rights, such as a Substitute Water Supply Plan.

6.4.14 Exhibit N – Source of Legal Right to Enter

55) This document must show that Raptor Materials LLC (rather than Varra Companies, Inc.) has the legal right to enter lands under this permit.

6.4.18 Exhibit R - Proof of Filing with County Clerk and Recorder

56) Please provide an affidavit or receipt indicating the date on which the revised application information required to address this adequacy letter was placed with the Weld County Clerk

and Recorder for public review, pursuant to Subparagraph 1.6.2(1)(c).

6.4.19 Exhibit S - Permanent Man-made Structures

57) The Division requires Raptor Materials LLC to demonstrate that they attempted to obtain notarized structure agreements with all owners of the structures within 200 feet of the affected area of the proposed mine site, pursuant to Rule 6.4.19. This attempt must be made prior to the Division's consideration of a stability analysis. Please also indicate what agreements have been obtained.

6.5 Geotechnical Stability Exhibit

58) The Division has reviewed the Slope Stability Analyses (prepared by AWES, LLC), and our comments are provided as an enclosure with this letter. Please review this memorandum and provide responses.

The Division is still reviewing two of the technical reports associated with this application: "Riverside Berm Failure Analysis and Flood Control Mitigation Plan" (Flow Technologies LLC, 2020) and "Dewatering Evaluation, Varra Two Rivers Mine" (AWES LLC, 2020). Division comments and questions related to these reports will be sent under separate cover.

Please be advised that the Two Rivers, Sand, Gravel, and Reservoir Project application may be deemed inadequate, and the application may be denied unless the above-mentioned adequacy review items are addressed to the satisfaction of the Division. If more time is needed to complete the reply, the Division can grant an extension to the decision date. This will be done upon receipt of a written waiver of the Applicant's right to a decision by July 17, 2022 and a request for additional time. This must be received no later than the decision date.

If you have any questions, please contact me at rob.zuber@state.co.us or (720) 601-2276.

Sincerely,

Robert D. Zuber, P.E.
Environmental Protection Specialist

Enclosures: Letters from Other Agencies
Groundwater Monitoring and Protection Technical Bulletin
Review of Slope Stability Analyses

Cc: Michael Cunningham, DRMS

ENCLOSURE 1

LETTERS FROM OTHER AGENCIES

History Colorado

Robert D. Zuber
Division of Reclamation, Mining and Safety
1313 Sherman Street, Room 215
Denver, Colorado 80203

Re: Two Rivers Sand, Gravel and Reservoir Project, File No. M-2022-013 (HC#81348)

Dear Mr. Zuber:

We received your letter dated April 18, 2022 initiating consultation with our office on the subject action pursuant to the Colorado State Register Act – Colorado Revised Statute (CRS) 24-80.1 et. seq.

A search of our database indicates that no properties of historical significance included or nominated for inclusion in the state register have been recorded within the proposed permit area. Please note, as most of Colorado has not been inventoried for cultural resources, our files contain incomplete information. Consequently, there is the possibility that as yet unidentified cultural resources exist within the proposed permit area. The requirements under CRS 24-80 part 13 apply and must be followed if human remains are discovered during ground disturbing activities.

Please note that if the fill or disposal site location is associated with a Federal undertaking, it is the responsibility of the federal agency to meet the requirements of Section 106 as set forth in 36 CFR Part 800 titled "Protection of Historic Properties". This includes not only reasonable and good faith identification efforts of any historic properties located within the area of potential effects, but determining whether the undertaking will have an effect upon such properties. The State Historic Preservation Office, Native American tribes, representatives of local governments, and applicants for federal permits are entitled to consultative roles in this process.

We thank you for the opportunity to comment. If we may be of further assistance, please contact Holly McKee-Huth, Cultural Resource Information/Section 106 Compliance at (303) 866-4670/holly.mckee@state.co.us.

Sincerely,

Dawn DiPrince
State Historic Preservation Officer

COLORADO
Division of Water Resources
Department of Natural Resources

Response to Reclamation Permit Application Consideration

DATE: April 27, 2022

TO: Robert D. Zuber, Environmental Protection Specialist,
rob.zuber@state.co.us

CC: Division 1 Office, District 2 Water Commissioner

FROM: Ioana Comaniciu, P.E.

RE: Two Rivers Sand, Gravel and Reservoir Project, File No. M-2022-013
Operator: Garrett C. Varra, Varra Companies, Inc., (303)-666-6657
Contact: Bradford Janes, Varra Companies, Inc., (303) 666-6657
Parts of Sections 3 and 4, Twp 4 North, Rng 66 West, 6th P.M., Weld County

CONDITIONS FOR APPROVAL

☒ The proposed operation will consume ground water by: ☒ evaporation, ☒ dust control, ☒ dewatering, ☒ water removed in the mined product, ☒ reclamation:

Prior to initiation of these uses of ground water, the applicant will need to obtain either a gravel pit or other type of well permit, as applicable. However, prior to obtaining a permit, an approved water supply plan or decreed plan for augmentation is required.

☒ Prior to approving a well permit, the applicant must conduct a field inspection of the site and document the locations of all wells within 600 feet of the permit area. The applicant must then obtain a waiver of objection from all well owners with wells within 600 feet of the permit area or request a hearing before the State Engineer.

COMMENTS: The subject application is for a surface mining operation on approximately 409.234 permitted acres located in parts of Sections 3 and 4, Township 4 North, Range 66 West of the 6th P.M. The areas to be mined are currently used for agricultural purposes. The primary commodities to be mined at the site are sand, gravel, topsoil overburden and borrow materials. Two mining areas designated as the Central Field and the North West Field were identified in this application as the primary extraction areas. The primary extraction area totals 234.06 acres (180.76 acres for Central Field and 53.30 acres for North-West Field). The remaining 175.17 acres of land within the permitted boundaries will include the secondary extraction (plant processing/stockpile areas and a wash pond) and existing and future access roads, levees and other structures.

The mining plan calls for excavation to remove aggregate from approximately 30 to 45 feet over the entire property. Groundwater occurs at an average weighted depth of approximately 8.4 feet below ground surface. Mining will be accomplished by dry-mining method. The site is proposed to be reclaimed as water resources for storage of decreed water rights or other water as allowed by this office as well as backfilling. The two primary extraction areas will be mined and reclaimed as developed two water storage reservoirs proposed to be lined in accordance with the August 1999 State Engineer Guidelines for Lining Criteria. Prior to the use/exposure of any ground water the applicant must first obtain a well permit and a substitute water supply plan or decreed plan for augmentation. The site must continue to be operated under a substitute water supply plan until such time as the proposed reservoirs are lined, lining approved by this office, backfilling completed and replacement of lagged depletions shall continue until there is no longer an effect on stream.

Any storm water runoff intercepted by this operation that is not diverted or captured in priority must infiltrate into the ground or be released to the stream system within 72 hours. Otherwise, the operator will be required to make replacements for evaporation.

The applicant may contact the State Engineer's Office with any questions.

THINK SAFETY FIRST!

*(*Upcoming days off: June 21-July 1)*

The mission of Colorado Parks and Wildlife (CPW) is to perpetuate the wildlife resources of the state, to provide a quality state parks system, and to provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as active stewards of Colorado's natural resources. CPW has a statutory responsibility to manage all wildlife species in Colorado; as such we encourage protection for Colorado's wildlife species and habitats through responsible development and land use planning.

With regards to the proposed Two Rivers Sand, Gravel and Reservoir Project (DRMS File No. M-2022-013), CPW has two main species of concern and their associated High Priority Habitats (HPHs):

1) Mule deer - specifically their severe winter range and migration corridors.
2) Aquatic native species.

The protection of HPHs is of extreme importance to CPW. HPHs are a subset of CPW's Species Activity Maps that we collect and regularly update for a variety of species and their particular habitats. We provide these maps to the public and regulatory agencies for the environmental assessment and land use commenting on a proposed development on a given parcel, and for general scientific research.

CPW recommends that all proposed projects be assessed to avoid, minimize, and/or mitigate impacts on sensitive wildlife species and their habitats. Our goal in responding to land use proposals, such as this project, is to provide complete, consistent, and timely information to all entities who request comments on matters within our statutory authority. CPW particularly examines the temporary and permanent surface occupancy (e.g., habitat loss) of a given project, as well as the expected increase in human activity (e.g., construction workers, maintenance workers, etc.).

Recommendations

- Mule Deer
  - *Severe Winter Range Habitat*. To demonstrate avoidance, CPW requests that this construction begins outside the mule deer wintering season (Dec. 1 to April 30). Recommended minimization measures would include minimizing the amount of fencing required, and using four-strand smooth wire wildlife-friendly fencing where appropriate.
  - *Migration Corridors*. Fencing is very important as the development and other adjacent developments abut both sites of the major movement corridor for deer. Besides the use of wildlife-friendly fencing, the developer should examine and implement ways to encourage the facilitation of spring and fall migrations and as a daily movement corridor for mule deer for the life of this mine and beyond. Some ideas could include a conservation easement, removing existing but unnecessary fences that bisect the riparian area and restrict mule deer north-south migrations, new shrub/tree plantings, noxious weed management, planting CPW's mule deer seed mix, and/or other creative ideas that the applicant can come with.
- Aquatic native species. To demonstrate avoidance, CPW requests that construction stays outside the 500-ft buffer from the river's ordinary high water mark. Recommended minimization measures would be to employ stormwater BMPs to protect eastern plains minnows from sedimentation.
- Revegetation. Also of importance to CPW is the revegetation of disturbed soils and the control of noxious weed species through the development of a noxious weed management plan prior to initiating construction activities. The revegetation of disturbed areas and control of invasive weed species are important components of the project and it is critically important that the site be restored back to the native plant community that currently exists on site. CPW prefers that native vegetation be retained on-site during the operational lifespan of the project, both as potential habitat for wildlife and to ensure successful reclamation of the project area, as noxious weeds could spread to adjacent habitats outside the project area.

[Quoted text hidden]

Zuber - DNR, Rob <rob.zuber@state.co.us> Mon, Jun 13, 2022 at 10:51 AM
To: "Marette - DNR, Brandon" <brandon.marette@state.co.us>
Cc: "Cunningham - DNR, Michael" <michaela.cunningham@state.co.us>, Michael Grooms - DNR <michael.grooms@state.co.us>, Angelique Curtis - DNR <angelique.curtis@state.co.us>, Boyd Wright - DNR <boyd.wright@state.co.us>

Thanks, Brandon.

<boyd.wright@state.co.us>

Hi Rob and Michael C.

Can we also add to our comments the following regarding wildlife escape ramps and retention ponds/lakes. I know we are late in getting our comments to you. I spoke with the landowner/applicant about this project prior to the submission of his application. That landowner/applicant has since sold his business (Varra Companies Inc.). I was told he (applicant) will stay with the new owner for another year for transition purposes. This project is large in scale, it has a long life expectancy for a mining operation, and the project is located near the confluence of two major river corridors east of the mountain foothills. As a result, the riparian zones (Thompson River and South Platte River) and agricultural fields within and adjacent to this project are important habitat types, nesting areas and transition zones for numerous wildlife species. If possible, it would be appreciated if the applicant was provided a copy of our recommendations. Especially given the fact that the company who will be mining this area has new ownership. The new owner will be the one mitigating these issues long term. We appreciate the opportunity to provide comments, although we are late in doing so. Thank you for your time.

Wildlife Escape Ramps

During open pit or open trench mining operations, CPW recommends backfilling escape ramps in areas where steep slopes occur. Escape ramps will allow wildlife to safely exit an open pit or trench if they become entrapped.

Retention ponds

Ponds or lakes created by reclamation efforts could potentially have significant value to wildlife. To maximize this benefit, CPW recommends that ponds be designed to include irregular shorelines and one or more islands to provide cover, shelter, and nesting areas for migratory birds. Islands should be at least 15’ x 25’ in size for every two surface acres of water in the pond. Shoreline and island slopes should be graded to a ratio of 4 horizontal feet to every 1 vertical foot of distance, with some areas having slopes no steeper than 8 horizontal feet to every 1 vertical foot of distance. Such shallow areas will allow for the establishment of a variety of aquatic vegetation and invertebrate prey for waterfowl and shorebirds. Shorelines should be re-vegetated with native aquatic vegetation.

Michael Grooms
District Wildlife Manager
Area 4 - Fort Collins
LIVE LIFE OUTSIDE
P 970.692.4028 | F 970.472.4458
317 West Prospect Rd., Fort Collins, CO 80525
michael.grooms@state.co.us | cpw.state.co.us

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ENCLOSURE 2

GROUNDWATER MONITORING AND PROTECTION TECHNICAL BULLETIN

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Groundwater Monitoring and Protection Technical Bulletin

November 19, 2019

Contents

1. Introduction

This document is intended to provide guidance on groundwater monitoring and protection to operators, consultants and regulatory staff concerned with permits issued by the Colorado Division of Reclamation, Mining and Safety (DRMS or Division). The guidance is given in the context of applicable statutes and regulations, and is an attempt to ensure that compliance requirements are clearly and unambiguously stated. This document is not all-inclusive with respect to the requirements, information, and materials needed for a complete groundwater monitoring program, as site specific requirements will vary widely.

This guidance addresses DRMS requirements only. Other divisions, such as the State Engineer's Office Division of Water Resources, have processes, requirements, and timelines that must be met for activities within their jurisdiction. It is recommended that applicants/permittees consult with all appropriate agencies in the planning phase prior to the start of work so that any deficiencies or conflicts can be addressed promptly.

Hyperlinks are embedded within the document text for convenience, but are subject to change or removal without notice and are not intended to be a definitive reference; a list of references is given in section 9.

2. Background and General Statutory Context

The passage of the Colorado Water Quality Control Act (C.R.S. Title 25, Article 8) in 1972 established the Water Quality Control Commission (WQCC), and assigned to it the duty to develop and maintain a comprehensive and effective program for the prevention, control, and abatement of water pollution, and for water quality protection throughout the state of Colorado. Within its general remit, three of the specific responsibilities of the WQCC are to:

- Classify state water
- Promulgate water quality standards
- Promulgate control and permit regulations

The Water Quality Control Division (WQCD) is the agency responsible for implementing and enforcing the standards and regulations adopted by the WQCC. The WQCD also provides staff support to the WQCC. Both the WQCC and WQCD are within the Colorado State Department of Public Health and Environment (CDPHE).

The Act was amended in 1989 with Senate Bill 181 (SB 89-181), to clarify the role of other state agencies, including DRMS, with specific responsibilities in the area of water quality control for certain industries or activities, and to designate them as "implementing agencies". Two Memorandums of

Agreement (MOA) were entered into by the agencies in order to fully implement the amendments made under SB 89-181. The first MOA, pertaining to coal mines, was signed on August 28, 1990; and the second, pertaining to mineral mines, was signed on December 14, 2010.

The MOAs clarify the roles and responsibilities of DRMS, WQCD and WQCC at sites where their jurisdictions overlap, and may be summarized as follows:

- WQCC is solely responsible for the adoption of water quality standards and classifications
- WQCD is solely responsible for issuance and enforcement of permits authorizing all point source discharges to surface waters, as well as enforcing any control or permit regulation adopted by WQCC
- DRMS is responsible for implementing standards and classifications for discharges, other than point source discharges to surface water, through its own regulatory programs after consultation with WQCC and WQCD

In addition to the division-wide responsibility described above, the regulatory programs within DRMS have statutory mandates to monitor groundwater and protect the hydrologic balance during and after mining operations under three separate acts specific to mining: the Colorado Mined Land Reclamation Act (C.R.S. Title 34, Article 32), the Colorado Land Reclamation Act for the Extraction of Construction Materials (C.R.S. Title 34, Article 32.5), and the Colorado Surface Coal Mining Reclamation Act (C.R.S. Title 34, Article 33).

The regulations developed under the acts cited in this section are discussed in greater detail in sections 3 and 4 of this document. Sections 5 through 8 discuss the implementation of the regulations, and include guidance on the permitting process and procedures necessary to ensure effective regulatory compliance.

3. Regulations under the Colorado Water Quality Control Act

Two of the regulations pertaining to groundwater promulgated by the WQCC under the Colorado Water Quality Control Act are relevant to DRMS:

- Regulation No. 41 – The Basic Standards for Groundwater
- Regulation No. 42 – Site-specific Water Quality Classifications and Standards for Groundwater

Reg. 41 establishes five classes of groundwater and the criteria for each; secondly, it establishes statewide water quality standards and the procedures for applying them; thirdly, it defines the term “point of compliance” and the provisions by which such a point should be established. Rule 41.6(B) identifies DRMS as an implementing agency and specifies that such agencies “shall establish the point of compliance for those activities under their control.”

Reg. 42 is the compilation of the actions taken by the WQCC to date in classifying site-specific areas of the state. In other words, it contains a complete description of the groundwater to which the WQCC has specifically assigned use classifications and water quality standards.

It is important to stress that **DRMS does not have the authority to classify groundwater or to set standards for groundwater quality, however it does have the authority and the legal obligation to establish points of compliance at which those standards set by the WQCC must be met**. In order to satisfy this obligation DRMS staff must: (i) determine whether the proposed activity has the potential to negatively impact the quality of groundwater, based primarily on an assessment of the physical characteristics of the site; (ii) if that potential does exist, determine the standards applicable at the site; and then (iii) locate one or more point of compliance where water quality can be measured and assessed against those standards. Although these tasks should be part of a comprehensive groundwater monitoring plan that addresses the requirements of other applicable regulations, it is helpful to consider the general procedure for compliance with Reg. 41 and 42 before examining specific details, (see figure 1).

The simplest situation is where an operator seeks to conduct mining operations in an area of classified groundwater. If the proposed operation is within a classified area, the standards contained in Regulation No. 42 apply. However, due to the very limited overall area that has been classified in Colorado to date under Regulation No. 42, this is not common. It is more likely that activity occurring under a permit issued by DRMS will be subject to the state-wide standards described in Reg. 41. If this is the case, tabulated numeric standards in 41.5(C)(2) and (3) for some radioactive materials and organic pollutants must not be exceeded; radioactive and organic pollutants not included in the tables must be maintained at the lowest practical level. In addition, assuming that the background level of Total Dissolved Solids (TDS) is not in excess of 10,000mg/L, the Interim Narrative Standard applies.

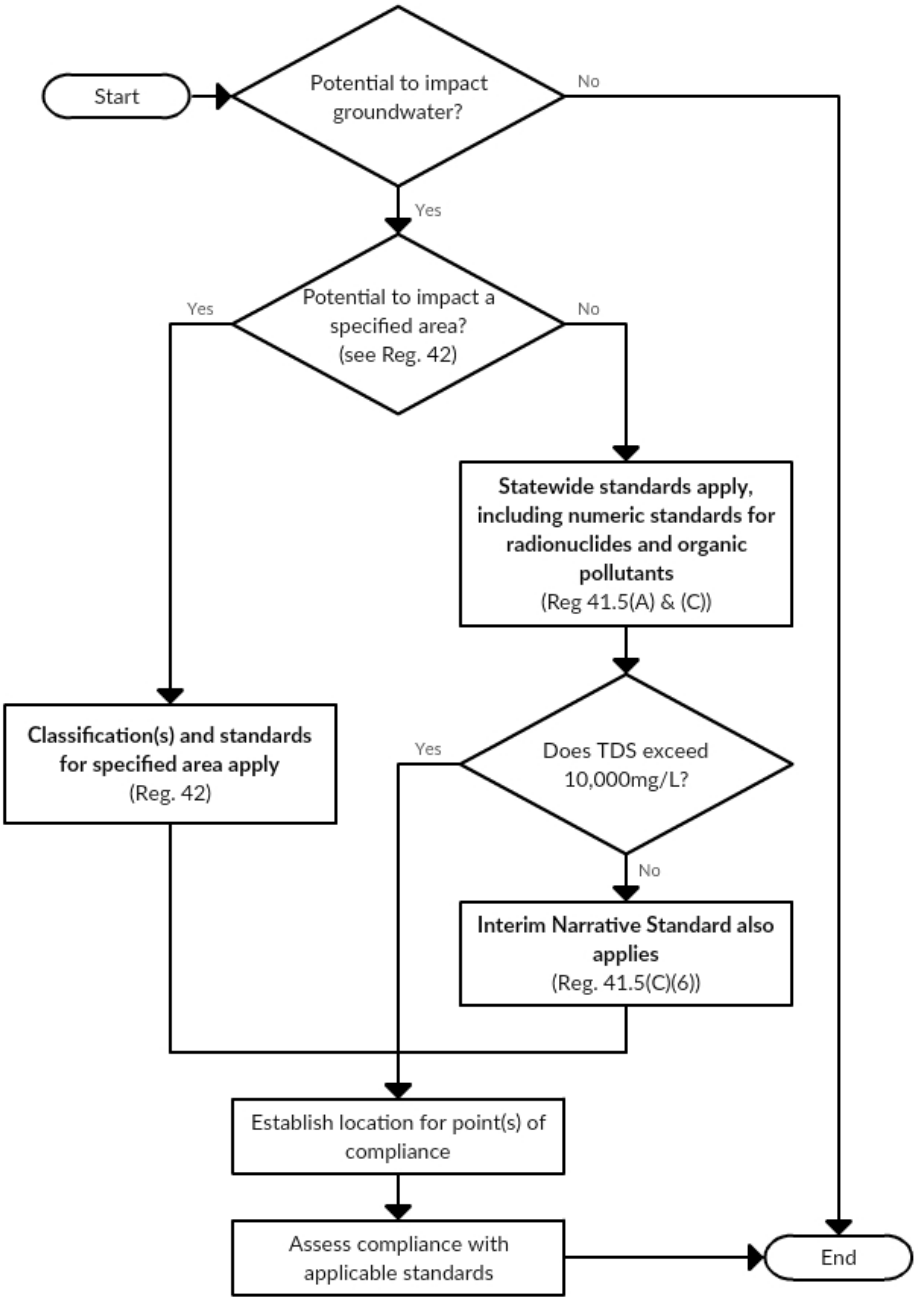

Figure 1: General procedure for compliance with Reg. 41 and 42

4. Regulations under Mining-specific Acts

The Colorado Mined Land Reclamation Act and the Colorado Land Reclamation Act for the Extraction of Construction Materials led to the promulgation of The Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal, and Designated Mining Operations (Hard Rock Rules) and The Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials (Construction Materials Rules) respectively. There are substantial differences between the two sets of rules, but they are structured similarly and, on the subject of groundwater, have similar requirements. Pertinent sections of the rules are:

- 1.4 – Application Review and Consideration Process
- 3.1.7 – Reclamation Performance Standards; Groundwater - Specific Requirements
- 6.4.7 – Water Information
- 6.4.21(8), (9) & (12) – Designated Mining Operation Environmental Protection Plan; Groundwater Information, Groundwater Quality Data & Water Quality Monitoring Plan
- 6.4.22-24 – Description, Baseline Site Characterization and Monitoring Plan for All In-Situ Leach Mining Operations

The Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (Coal Rules) were promulgated under the Colorado Surface Coal Mining Reclamation Act, and have specific requirements pertaining to groundwater. Pertinent sections of the regulations are:

- 2.04.7 – Hydrology Description
- 2.05.6(3) – Protection of Hydrological Balance
- 4.05.13 - Surface and Ground Water Monitoring

It is outside the scope of this guidance to discuss the specific requirements of each of these rules, however general requirements are discussed in section 7.

5. DRMS Implementation of the Interim Narrative Standard

The Interim Narrative Standard is described completely in section 41.5(C)(6) of Reg. 41, and applies to all unclassified groundwater in the state, unless TDS exceeds 10,000mg/L. The standard is simply stated as follows:

> Groundwater quality shall be maintained for each parameter at whichever of the following levels is less restrictive:
>
> (A) Existing ambient quality as of January 31, 1994,
>
> or
>
> (B) That quality which meets the most stringent criteria set forth in Tables 1 through 4 of "The Basic Standards for Ground Water."

The Interim Narrative Standard does not define or limit the potential need for remediation of contaminated groundwater; however it does ensure that even contaminated groundwater is not allowed to be further degraded pending remedial action.

"Existing ambient quality" is a key phrase in the Interim Narrative Standard. Section 41.5(C)(6)(b)(iii) allows implementing agencies, such as DRMS, to exercise their best professional judgment as to what constitutes adequate information to determine or estimate existing ambient quality, taking into account the location, sampling date, and quality of all available data. This gives the Division some discretionary authority, however there are two additional clauses that limit the scope of that authority:

- Data generated subsequent to January 31, 1994, shall be presumed to be representative of existing quality as of January 31, 1994, if the available information indicates that there have been no new or increased sources of ground water contamination initiated in the area in question subsequent to that date.

- If available information is not adequate to determine or estimate existing ambient quality as of January 31, 1994, groundwater quality for each parameter shall be assumed to be no worse that the most stringent levels provided for in Tables 1 through 4 of "The Basic Standards for Ground Water"

The implementation of the Interim Narrative Standard by DRMS is summarized as follows:

The applicable groundwater quality standards for new and permitted mine sites are the most stringent criteria set forth in Tables 1 through 4 of "The Basic Standards for Ground Water"

UNLESS

The permittee/applicant provides to DRMS sufficient data and documentation demonstrating that ambient levels of applicable analytes exceeded table value standards prior to January 31, 1994;

OR

The permittee/applicant provides to DRMS sufficient data and documentation demonstrating that data collected after January 31, 1994, which shows water quality parameters in excess of table value standards, are representative of pre-1994 conditions; and that there have been no new or increased sources of groundwater contamination in the area since.

Note that:

- It is the permittee/applicant's burden to provide substantial evidence and documentation to DRMS to demonstrate to DRMS's satisfaction that any proposed "pre-94" site-specific exemption from table value standards is appropriate for their site.
- If DRMS deems that a "pre-94" exemption from the table value standards is appropriate, the highest documented (valid/non-outlier) ambient value of that analyte shall be used as the numeric limit for that water quality parameter.

The only other way a DRMS permitted site may allowably exceed table value standards would be for the permittee/applicant to obtain a site-specific exemption or variance from the WQCC through the rulemaking process.

6. DRMS Establishment of Points of Compliance

As an implementing agency, DRMS shall establish the point of compliance for those activities under its jurisdiction. It is acknowledged in Reg. 41 that mining activities occur within ground water bodies and that water quality within the disturbed area will change. The point(s) of compliance established outside the area anticipated to be disturbed may protect the water body while allowing the mining activity.

DRMS protocol for establishing points of compliance is given in Section 3.1.7(6) of the Hard Rock Rules and Construction Materials Rules, and in Section 4.05.13(1) of the Coal Rules. There is some variation in the precise terms of those rules, however the following general guidance applies to all sites operating under a DRMS permit.

A point of compliance shall be established for all potentially impacted groundwater; multiple points of compliance may be necessary for a given operation, depending on the hydro-geologic conditions at the site. Compliance with groundwater quality standards must be achieved at points of compliance.

Points of compliance shall be located at some distance hydraulically down-gradient from the source of potential contamination. The point shall be at:

The hydrologically downgradient limit of the area in which contamination has been identified

OR

The permit boundary

OR

A specified distance, agreed to by the Division and the permittee/applicant, taking into consideration:

- Applicable water quality standards

- Hydro-geologic conditions at the site

- Toxicity, mobility and environmental persistence of potential contaminants

- Potential of the site as an aquifer recharge area

- Technical and economic feasibility

Note that enforcement action(s) may result from the exceedance of one or more water quality parameters at a Point of Compliance location, or from failure to adhere to the sampling and reporting protocols approved in the Groundwater Monitoring Plan.

7. General Groundwater Monitoring Requirements

Groundwater monitoring and compliance requirements for specific permits and activities vary widely according to the complexity of the activity and the site, but are generally implemented through the following basic process:

A. The permittee/applicant shall conduct a site-wide hydro-geologic characterization prior to disturbance at any given site. This baseline characterization must determine, at a minimum, if the proposed activity has the potential to impact groundwater. If the potential to impact groundwater exists, thorough characterization is essential.

A baseline characterization of existing site groundwater conditions should be completed for both groundwater quality and quantity. Data should be collected in order to locate and construct appropriate monitoring wells and points of compliance, and to fully implement appropriate water quality standards. Revisions to a permit may require new baseline characterization studies. The characterization investigation should be conducted by a qualified

individual, preferably a Professional Geologist (PG), Registered Geologist (RG), or other certified professional experienced in hydro-geologic characterization, and should include:

- A complete description of the geologic setting, including each aquifer above, within and, if potentially impacted, below the lowest unit to be mined.
- Seasonal quantity and quality data for the water in each aquifer, (refer to tables 1 through 4 of Reg. 41 for water quality parameters).
- A description of the recharge, storage, transmissivity and discharge characteristics of each aquifer.
- A complete list of registered wells in the proposed permit and adjacent areas, with locations, completion intervals and reported yields.

B. For the Coal permitting process, a prediction of the Probable Hydrologic Consequences of the proposed activity shall be made. This is not a requirement for minerals or construction materials permits.

C. A Groundwater Monitoring Plan shall be designed so as to allow a determination to be made of the effects of the permitted activity on the quantity and quality of water in groundwater systems in the permit and adjacent areas, and to verify any predictions made in the permit. The plan should include monitoring points up- and down-gradient of any potential sources of contamination, and provision to directly monitor any mine pool as it develops.

D. The locations of Points of Compliance shall be determined in the context of the Groundwater Monitoring Plan. It is advised, but not required, that monitoring wells be located up-gradient of Points of Compliance so as to allow timely remedial action to be taken if necessary.

E. All monitoring wells and piezometers shall be permitted with the State Engineer's Office (SEO) Division of Water Resources (DWR) and constructed and abandoned according to the required SEO standards. Adherence to these standards will protect aquifer integrity and provide representative, defensible data. Failure to follow the applicable permitting and well construction rules could result in unacceptable data; and failure to adequately protect groundwater resources may result in subsequent enforcement action as deemed appropriate by DRMS or the SEO.

F. All wells shall be installed by a licensed contractor, as required by SEO. Appropriate site specific well placement and construction details should be recorded and approved by a qualified professional, before being submitted to DRMS. DRMS may require the installation of additional wells for adequate characterization and/or monitoring.

G. Sampling protocols shall be described in the Groundwater Monitoring Plan and followed during each sampling event.

H. Analysis of samples shall be by an accredited laboratory.

8. Release of Reclamation Liability for Sites with Groundwater Monitoring

It is the permittee's burden to demonstrate to the satisfaction of DRMS, through the data collected for the Groundwater Monitoring Plan, and any other data deemed necessary, that all applicable table value standards, and/or site-specific standards for groundwater quality established in accordance with Reg. 41 and/or Reg. 42 have been met, and that existing and reasonably potential future uses of groundwater have been protected.

9. References

[1] Board of Examiners of Water Well Construction and Pump Installation Contractors. Rules And Regulations For Water Well Construction, Pump Installation, Cistern Installation, And Monitoring And Observation Hole/Well Construction, 2 CCR 402-2 § (2016). Retrieved from: http://water.state.co.us/DWRIPub/Documents/BOE%20Water%20Well%20Construction%20Rules%202%20CCR%20402-2%20_20160901.pdf

[2] Colorado Department of Public Health and Environment, Water Quality Control Commission. Regulation 41 - The Basic Standards For Groundwater, 5 CCR 1002-41 § (2016). Retrieved from: https://www.colorado.gov/pacific/sites/default/files/41_2016%2812%29.pdf

[3] Colorado Department of Public Health and Environment, Water Quality Control Commission. Regulation 42 - Site-Specific Water Quality Classifications And Standards For Groundwater, 5 CCR 1002-42 § (2018). Retrieved from: https://www.colorado.gov/pacific/sites/default/files/42_2018%2806%29.pdf

[4] Colorado Land Reclamation Act for the Extraction of Construction Materials, C.R.S. 34-32.5 §.

[5] Colorado Mined Land Reclamation Act, C.R.S. 34-32 §.

[6] Colorado Mined Land Reclamation Board. Regulations of the Colorado Mined Land Reclamation Board for Coal Mining, 2 CCR 407-2 § (2005). Retrieved from: http://mining.state.co.us/SiteCollectionDocuments/CoalRegulations91405.pdf

[7] Colorado Mined Land Reclamation Board. Mineral Rules And Regulations Of The Colorado Mined Land Reclamation Board For The Extraction Of Construction Materials (2006). Retrieved from: http://mining.state.co.us/SiteCollectionDocuments/Revised-ConstrMatadoptedAug92006indexed.pdf

[8] Colorado Mined Land Reclamation Board. Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal, and Designated Mining Operations (2015). Retrieved from: http://mining.state.co.us/SiteCollectionDocuments/Hard%20Rock%20Rules%20Adopted%20January%2015.pdf

[9] Colorado Surface Coal Mining Reclamation Act, C.R.S. 34-33 §.

[10] Colorado Water Quality Control Act, C.R.S. 25-8 §. Retrieved from: https://www.colorado.gov/pacific/sites/default/files/Act2017.pdf

[11] Memorandum Of Agreement For The Implementation Of SB 181 Amendments To The Colorado Water Quality Control Act (25-8-101, et seq) Pertaining To The Regulation Of Coal Mines. (1990, August 28). Retrieved from: https://www.colorado.gov/pacific/sites/default/files/T1_WQCC_181MOA_Mined-Land-Regarding-Coal-Mines.pdf

[12] Memorandum Of Agreement For The Implementation Of SB 181 Amendments To The Colorado Water Quality Control Act (25-8-101, et seq) Pertaining To The Regulation Of Mineral Mines. (2010, December 14). Retrieved from: https://www.colorado.gov/pacific/sites/default/files/T1_WQCC_181MOA_DRMS.pdf

ENCLOSURE 3

REVIEW OF SLOPE STABILITY ANALYSES

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Date: **June 1, 2022**

To: **Rob Zuber**

CC: **Jason Musick, Michael Cunningham**

From: **Zach Trujillo**

RE: **Two Rivers Application, DRMS File No. M-2022-013**
Technical Adequacy Review

Rob,

As requested I have reviewed the proposed 112c Permit Application for the Two Rivers Sand, Gravel and Reservoir Project (Twin Rivers) submitted by Raptor Materials, LLC (RM) in relation to the requested and applicable Rules, Regulations and Policies. The primary focus of this review as requested is to ensure Rule 6.5 of the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials has been satisfied. Additionally, proposed geotechnical stability support material as part of the application was reviewed in relation to Section 30 of the Policies of the Mined Land Reclamation Board (Section 30).

Rule 6.5

- Per Rule 6.5(1)[o]n a site-specific basis, an Applicant shall be required to provide a geotechnical evaluation of all geologic hazards that have the potential to affect any proposed impoundment, slope, embankment, highwall, or waste pile within the affected area. A geologic hazard is one of several types of adverse geologic conditions capable of causing damage or loss of property and life. The Applicant may also be required to provide a geotechnical evaluation of all geologic hazards, within or in the vicinity of the affected lands, which may be de-stabilized or exacerbated by mining or reclamation activities.

- Per Rule 6.5(2), [o]n a site-specific basis, an Applicant shall be required to provide engineering stability analyses for proposed final reclaimed slopes, highwalls, waste piles and embankments. An Applicant may also be required to provide engineering stability analyses for certain slopes configuration as they will occur during operations, including, but not limited to embankments. Information for slope stability analyses may include, but would not be limited to, slope angles and configurations, compaction and density, physical characteristics of earthen materials, pore pressure information, slope height, post-placement use of site, and information on structures or facilities that could be adversely affected by slope failure.

- Per Rule 6.5(3), [w]here there is the potential for off-site impacts due to failure of any geologic structure or constructed earthen facility, which may be caused by mining or reclamation activities, the Applicant shall demonstrate through appropriate geotechnical and stability analyses

1313 Sherman Street, Room 215, Denver, CO 80203 P 303.866.3567 F 303.832.8106 http://mining.state.co.us
Jared S. Polis, Governor | Dan Gibbs, Executive Director | Virginia Brannon, Director

that off-site areas will be protected with appropriate factors of safety incorporated into the analysis. The minimum acceptable safety factors will be subject to approval by the Office, on a case-by-case basis, depending upon the degree of certainty of soil or rock strength determinations utilized in the stability analysis, depending upon the consequences associated with a potential failure, and depending upon the potential for seismic activity at each site.

As part of Snake River's application, a geotechnical site investigation and stability analysis was provided under Exhibit 6.5: Slope Stability Analyses (Report). Material strength properties used in the analyses were determined from field investigation and lab testing. A total of twelve investigative borings were drilled throughout the proposed permit area where bulk samples were obtained and then lab tested. Material strength properties are summarized in Table 1 – Soil Strength Properties of the Report as well as associated lab results. Each borehole after completion was then converted to monitoring wells 1 through 12 as shown on Figure 1 of the Report. Detailed borehole logs showing subsurface conditions are also provided within the Report.

As part of the Report, multiple slope stability analyses were performed using the strength material properties and associated profiles attained from the site investigation and lab testing. The proposed set of analyses within the Report takes into consideration four general highwall scenarios under static conditions for the Snake River operation.

1. 40 foot mine depth with a bank cut of 1.25H:1V (Plate 1),

2. 47 foot mine depth with a bank cut of 2H: 1V for the bottom 20 feet and 1.25 H: 1V for the remaining slope (Plate 2),

3. 47 foot mine depth with a bank cut of 2H: 1V for the bottom 20 feet and 1.25H: 1V for the remaining slope with overburden (Plate 3) and,

4. 37 foot mine depth with a lower 20 foot bank cut of 2H: 1V with the remaining slope of 1.25H: 1V (Plate 4)

The resulting Factors of Safety (FoS) are shown below in Table 1. of this memo:

Table 1. Snake River FoS

Analysis	FoS
Plate 1	1.303
Plate 2	1.407
Plate 3	1.533
Plate 4	1.41

Each resulting FoS from the four analyses indicate slope stability however, there appears to be inconsistencies in the friction angle used for Bedrock as detailed in the cross-sectional slope stability result printouts provided at the end of the Report. Based on Table 1 – Soil Strength Properties, Bedrock has been assigned a friction angle of 22 degrees however of the four analyses, only Plate 4 uses this friction angle. Plate 1, 2 and 3 use a friction angle of 14 degrees. Please see Comments at the end of this memo for requested information.

Additionally, it is unclear on what conditions would determine the proposed highwall to be constructed to one of the four scenarios. Based on the differing material profiles within the cross-sectional slope stability result printouts provided, it appears to the Division that it might be based the strata and/or location within the proposed permit. Additional clarification will be necessary. Please refer to the Comments section of this memo.

Section 30

Based on the information in the Report provided by Snake River and Table 1 of Section 30.4, FoS will be compared to strength measurements resulting from multiple tests for a critical structure. For static conditions, minimum required factor of safety is 1.3 and for seismic conditions, minimum required factor of safety is 1.15. As noted earlier under section Rule 6.5 of this memo, each resulting FoS from the four analyses indicate slope stability under static conditions. However, additional discussion will be need to be provided which will be outlined under the Comments at the end of this memo. In addition, the four scenarios provided in the Report were only analyzed on under static conditions and no models were ran or provided under seismic conditions as required under Section 30.

Comments

1. **Please provide updated slope stability models and associated FoS using the correct friction angle for bedrock.**

2. **Please provide additional discussion in regards to conditions or scenarios which determine one of the four proposed highwall slope configuration.**

3. **Please provide slope stability analyses for the four highwall scenarios under seismic conditions including rational for the seismic coefficient used in the analyses.**

Upon receipt of the requested responses and clarifications, a slope stability analysis "check" will be performed by the Division and provided within an additional memo. This concludes my review and comments for the proposed 112c Permit Application for the Two Rivers Sand, Gravel and Reservoir Project submitted by Raptor Materials, LLC in relation to the requested and applicable Rules, Regulations and Policies. If you have any questions feel free to contact me.

Sincerely,

Zach Trujillo
Environmental Protection Specialist
(303) 866-3567 ext. 8164
Zach.Trujillo@state.co.us